PB-215 047

ORGANISMS ASSOCIATED WITH POLLUTION. (A SELECTION OF ILLUSTRATIONS)

H. W. Jackson

Sanitary Engineering Center
Cincinnati, Ohio

1965

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ORGANISMS ASSOCIATED WITH POLLUTION

(A Selection of Illustrations)

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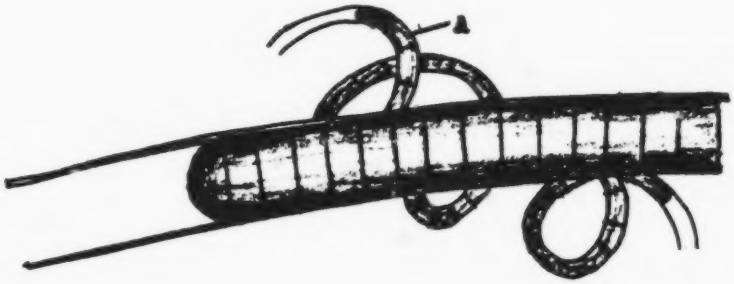
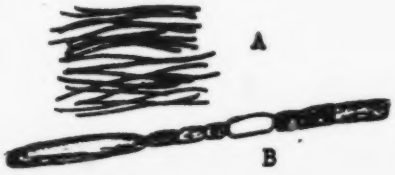
Blue-Green Algae , Cyanophyceae

Oscillatoria spp., filaments (trichomes) range from .6 to over 60 μ in diameter. Ubiquitous, pollution tollerant.



Lyngbia spp., similar to Oscillatoria but has a sheath.
A, Lyngbia contorta, reported to be generally intollerant of pollution ; B, L. birgei.



Aphanizomenon flos-aquae
A, colony; B,filament

Anabaena flos-aquae
A, akinete; B,heterocyst

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Details of illustrations in this document may be better studied on microfiche.

Flagellated Algae

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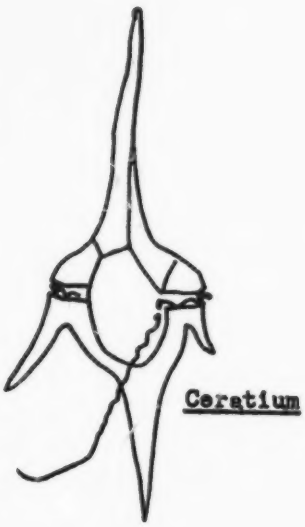
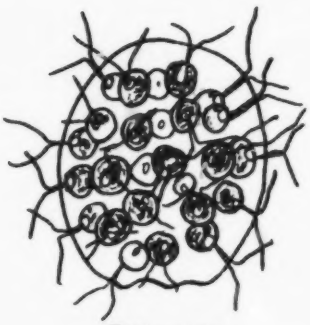
Goniaulax

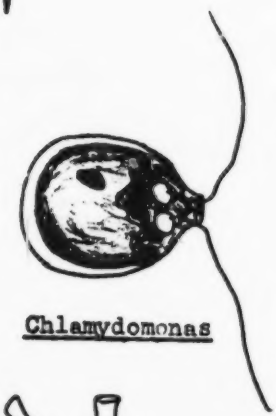


Ceratium

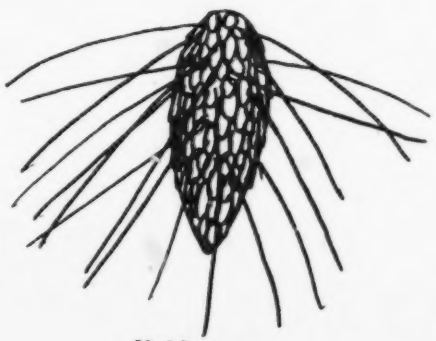


Eudorina

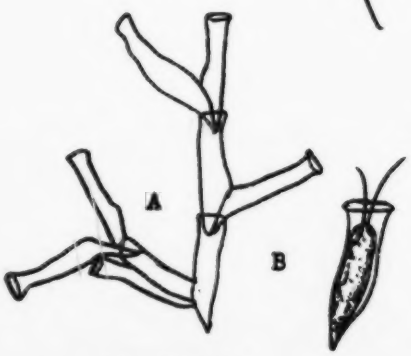
Trachelomonas



Chlamydomonas



Mallomonas



Dinobryon

A, form of colony; B, cell in lorica.

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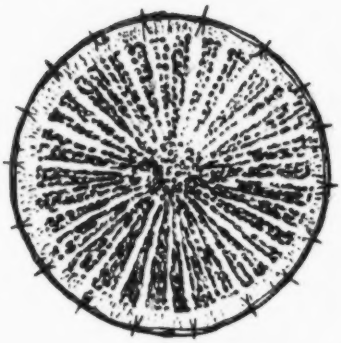
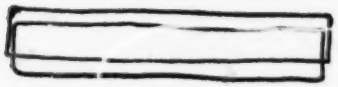
Diatoms - Bacillariophyceae

3/4



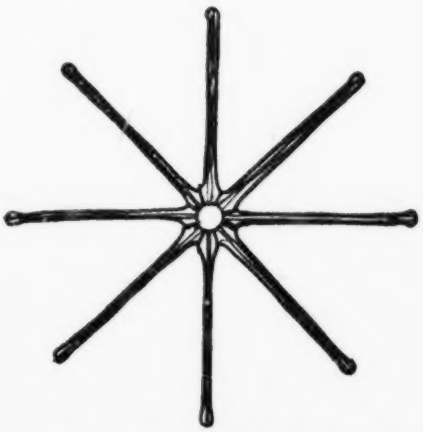
Valve views

Girdle views, stylized to show basic diatom structure.

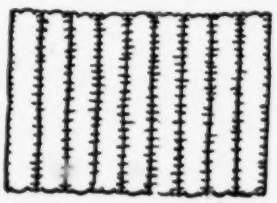


A discoid or central diatom such as Stephanodiscous

A pennate or naviculer diatom such as Fragillaria



A colony of Asterionella (girdle views)



A colony of Fragillaria (girdle views)

Gomphonema
A, valve view; B, girdle view.

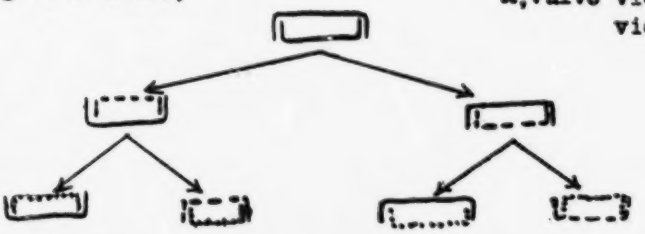


Diagram showing progressive diminution in the size of certain frustules through successive cell generations of a diatom.

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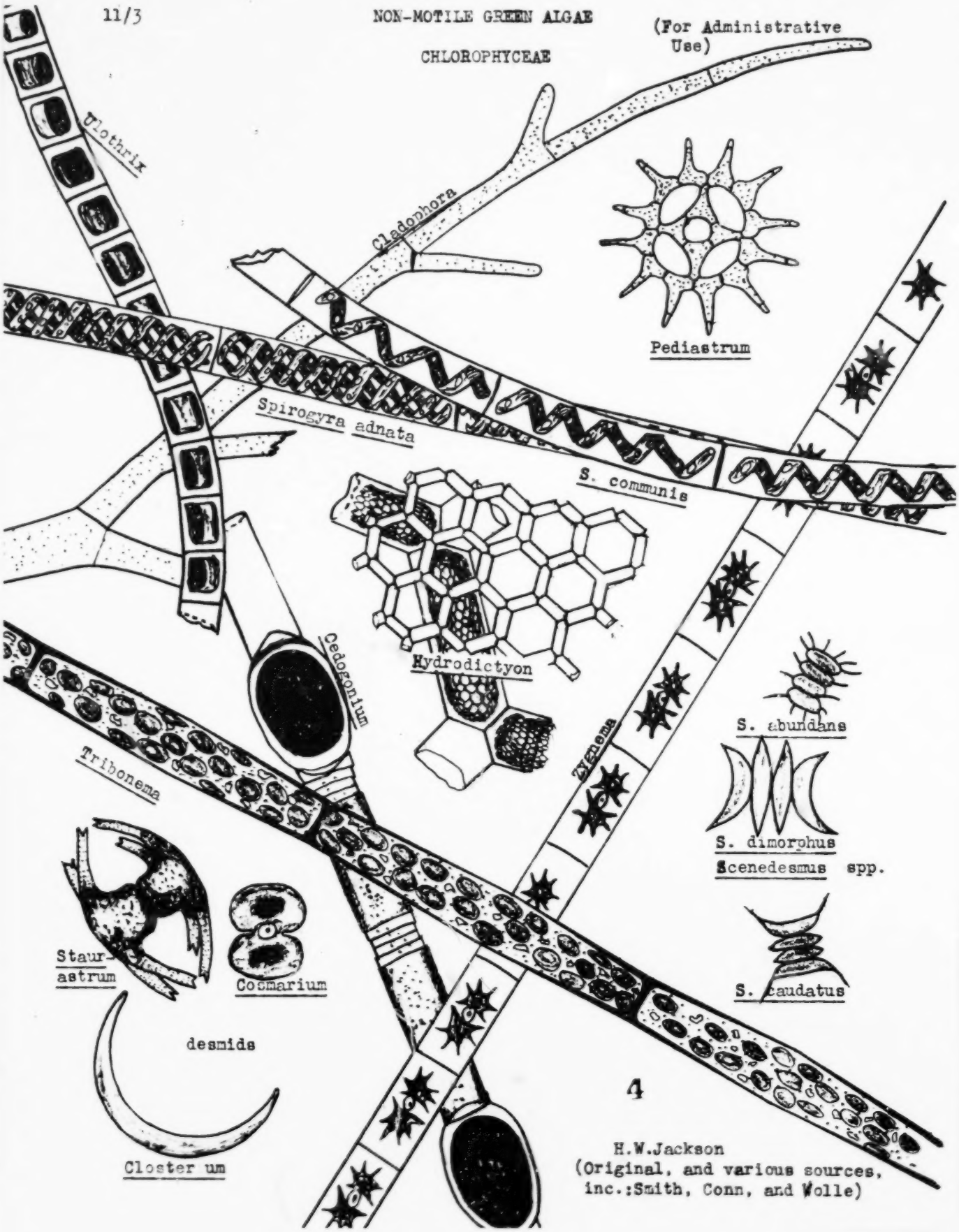
NON-MOTILE GREEN ALGAE

CHLOROPHYCEAE

(For Administrative Use)



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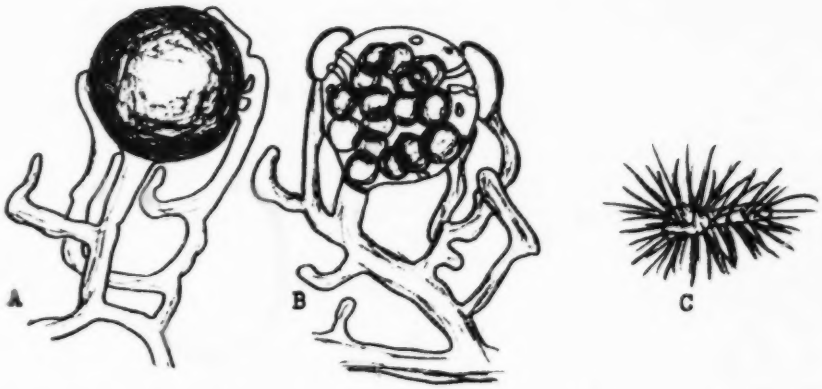
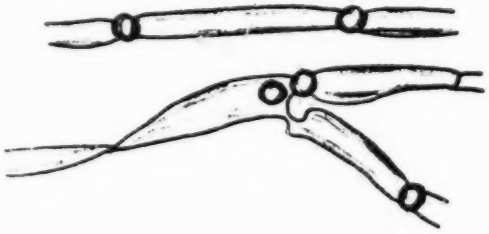
(Original, and various sources, inc.:Smith, Conn, and Wolle)

Schizomycetes - Bacteria, free living representatives

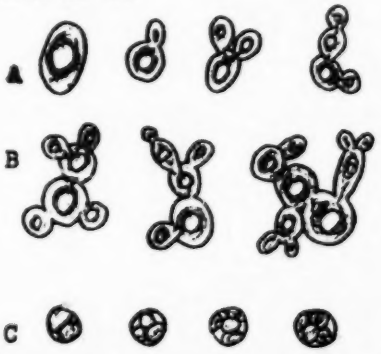
Aerobacter aerogenes | Rhizobium radicicola | Azotobacter



Phycomycetes - Saprolegnia; A, detail of immature reproductive stages; B, mature oogonium and antheridia, with eggs and fertilization tubes; C, dead tadpole with growth of S.



Phycomycete - Leptomitus, this genus includes pollution tollerant species.



Ascomycete - Saccharomyces, a yeast including poll. tollerant species. A, single cell; B, budding; C, ascospore formation.

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Phylum PROTOZOA

Free Living Representatives

I. Flagellated Protozoa, Class Mastigophora

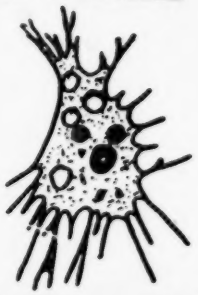
Anthophysis
Pollution tollerant
6 μ

Bodo
Pollution tollerant
19 μ

Colony of Poteriodendron
Pollution tollerant, 35 μ

II. Ameboid Protozoa, Class Sarcodina

Dimastigamoeba
Pollution tollerant
10-50 μ



Nuclearia, reported to be intollerant of pollution, 45 μ.

Difflugia
Pollution tollerant
60-500 μ

III. Ciliated Protozoa, Class Ciliophora

Colpoda
Pollution tollerant
20-120 μ

Holophrya, reported to be intollerant of pollution, 35 μ

Epistylis, pollution tollerant. Colonies often macroscopic.

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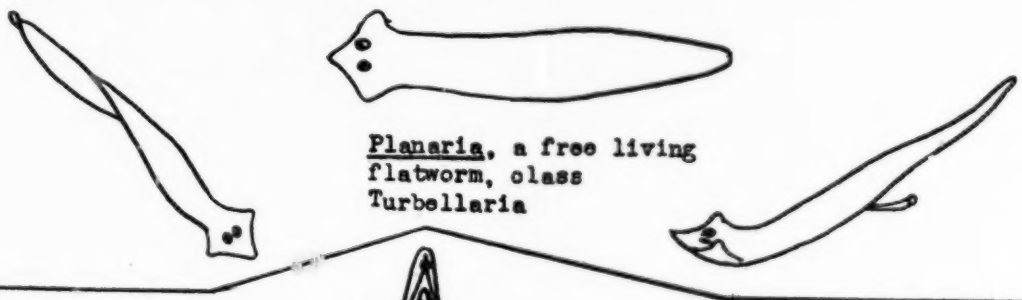
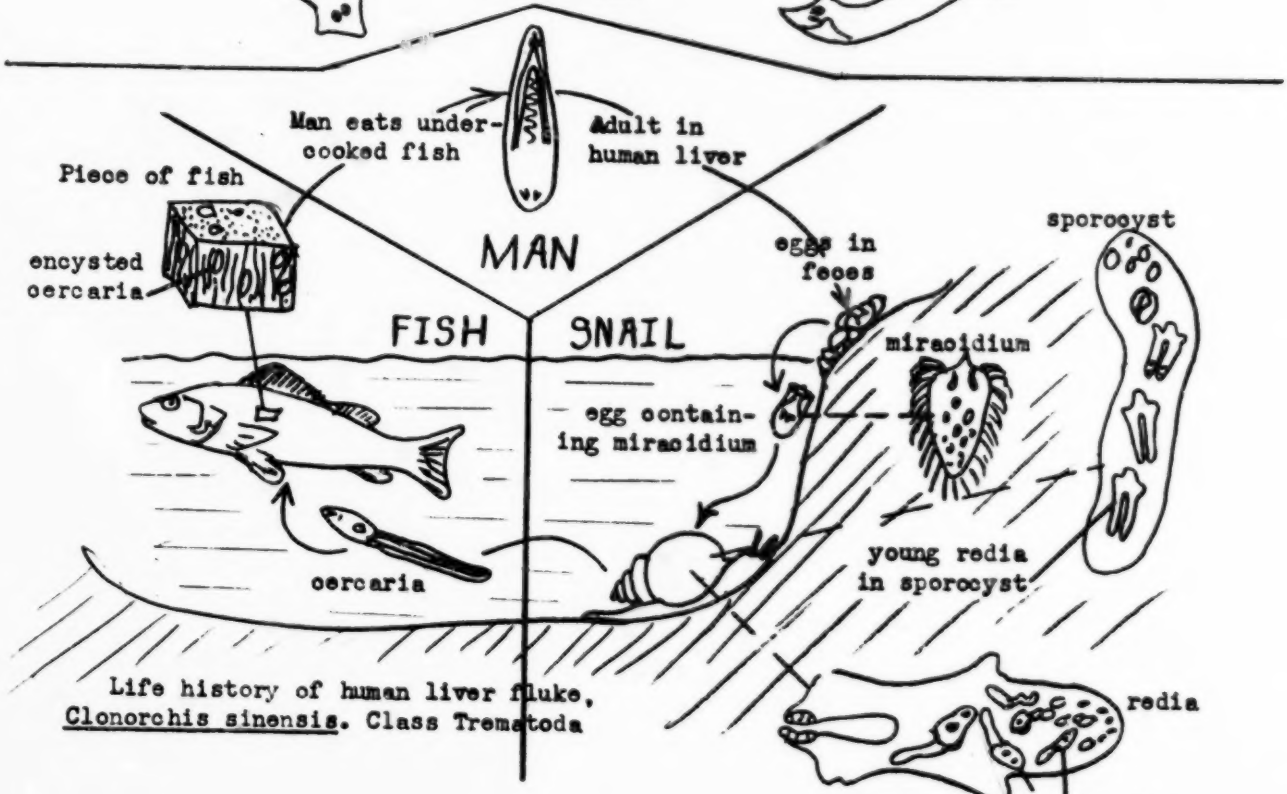
Flatworms

Phylum PLATYHELMINTHES

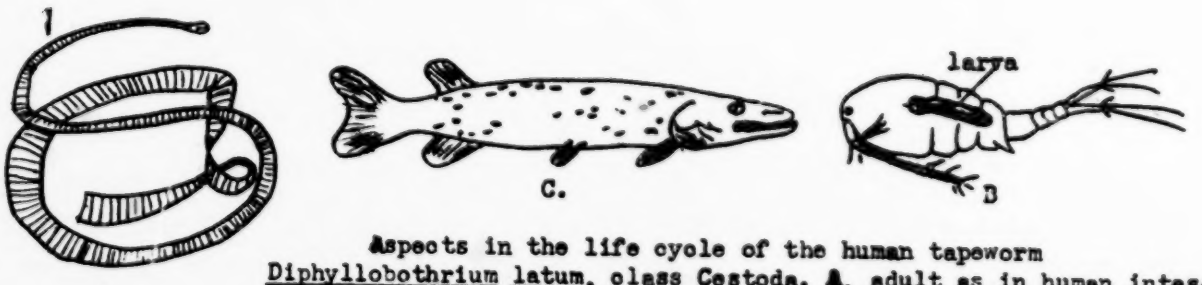
3/4



Planaria, a free living flatworm, class Turbellaria



Life history of human liver fluke, Clonorchis sinensis. Class Trematoda



Aspects in the life cycle of the human tapeworm Diphyllobothrium latum, class Cestoda. A, adult as in human intestine; B, procercoid larva in copepod; C, plerocercoid larva in flesh of pickerel (X-ray view).

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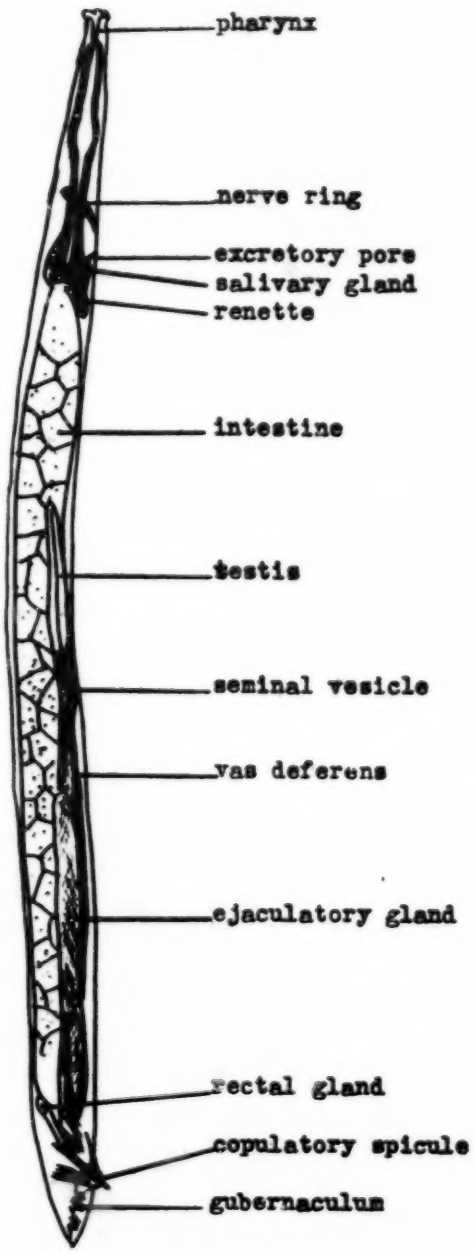
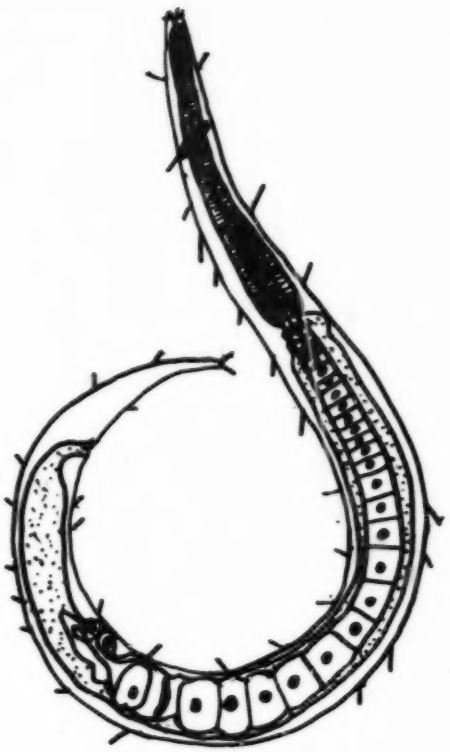
FREE LIVING NEMATHELMINTHES, OR ROUND WORMS

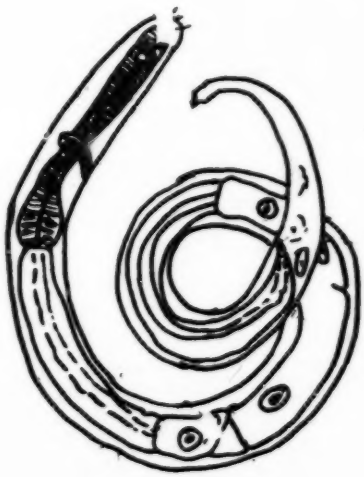
(For Administrative Use)



Rhabditis ♂



Monhystera ♀



Achromadora ♀

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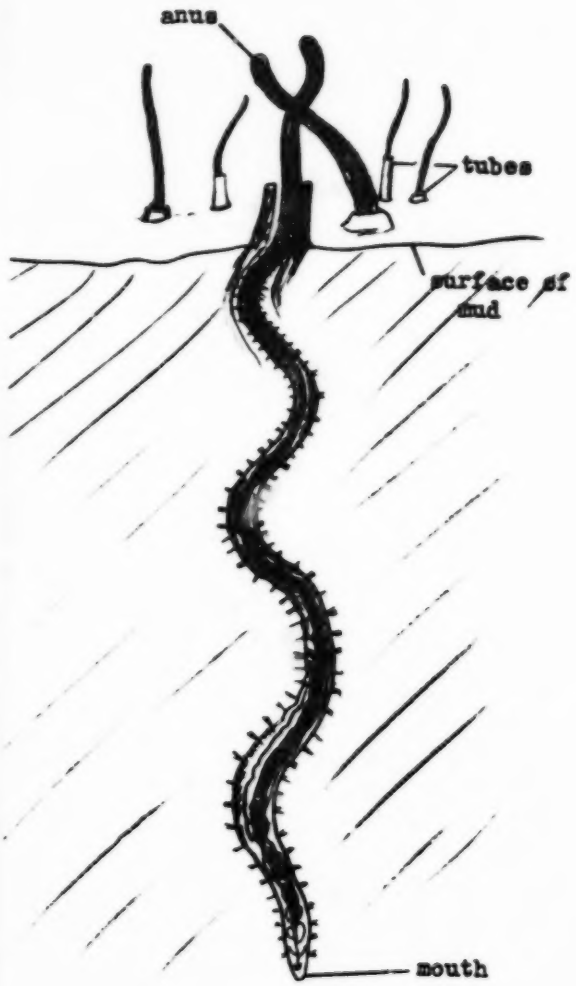
(After Pennak)

FRESH WATER ANNELID WORMS

Phylum Annelida

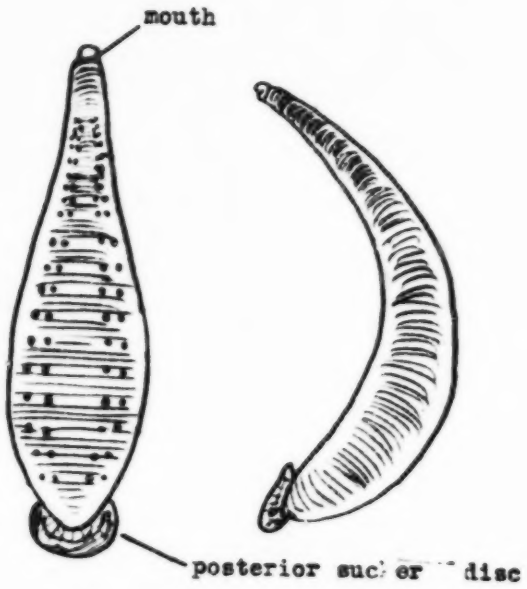
(For administrative use)



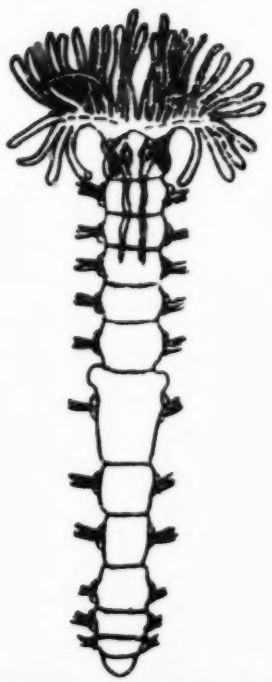
Class Oligochaeta, earthworms

Ex: Tubifex sp., the sludgeworm

(After Liebman)



Class Hirudinea, leeches
(After Regner)



Class Polychaeta , polychaet worms

Ex: Manayunkia, a minute, rare, tube building worm.

(After Leidy)

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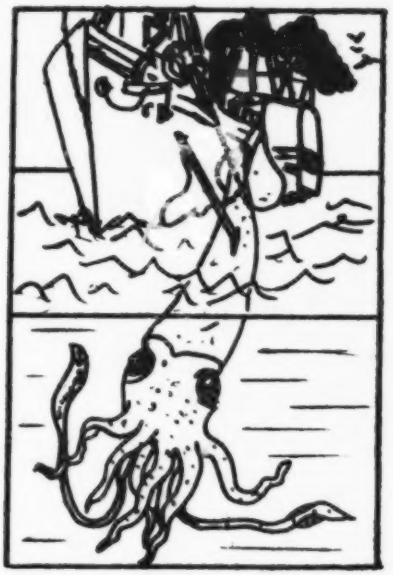
SOME MOLLUSCAN TYPES

(For Administrative Use)

Class: Cephalopoda; Squids, octopus, cuttlefish.



Exclusively marine. The giant squid shown was captured in the Atlantic in the early nineteenth century. (After Hegner)

Limax, a slug

Lymnaea an air breathing snail

Campeloma a water breathing snail

Class: Gastropoda; snails and slugs. (After Buchsbaum)

Class: Pelecypoda; clams, mussels, oysters.

Locomotion of a freshwater clam, showing how foot is extended, the tip expanded, and the animal pulled along to its own anchor. (After Buchsbaum)

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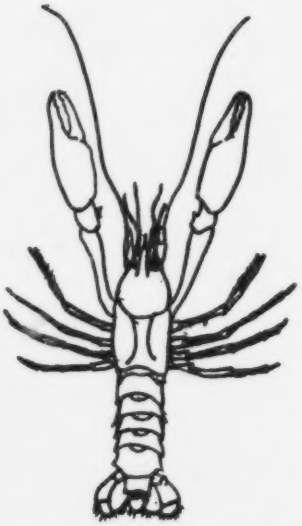
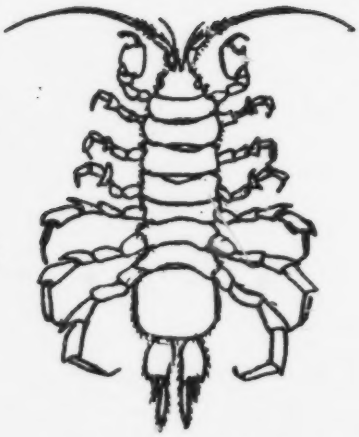
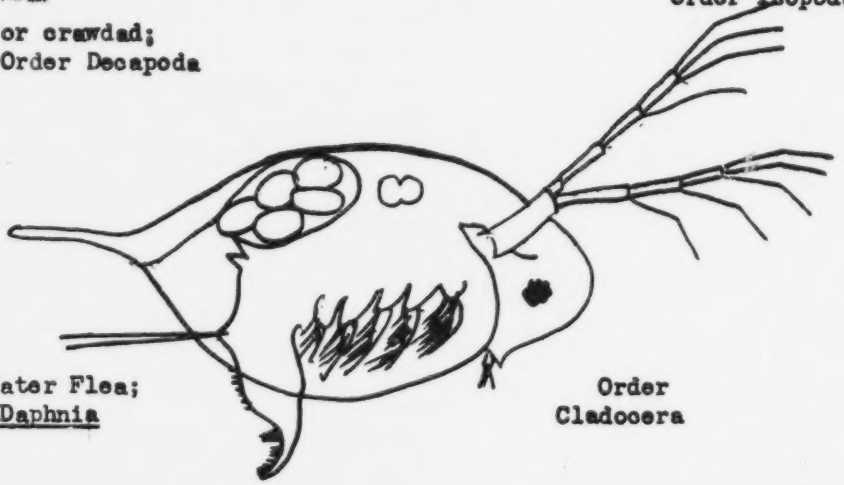


Crayfish, or crawdad;
Cambarus, Order Decapoda

Fairy Shrimp;
Eubranchipus, Order
Phyllopoda

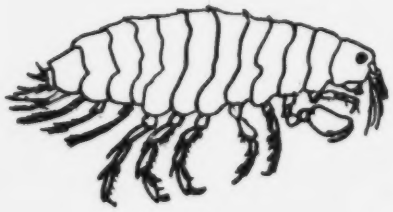


Sow Bug; Asellus,
Order Isopoda

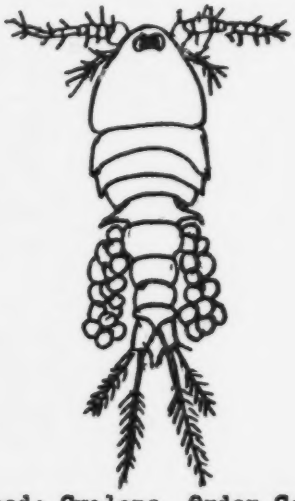


Water Flea;
Daphnia

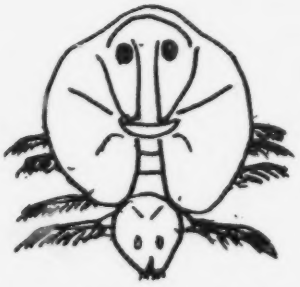
Order
Cladocera



Scud; Hyalella
Order Amphipoda



Copepod; Cyclops, Order Copepoda



Fish Louse, Argulus;
a parasitic Copepod

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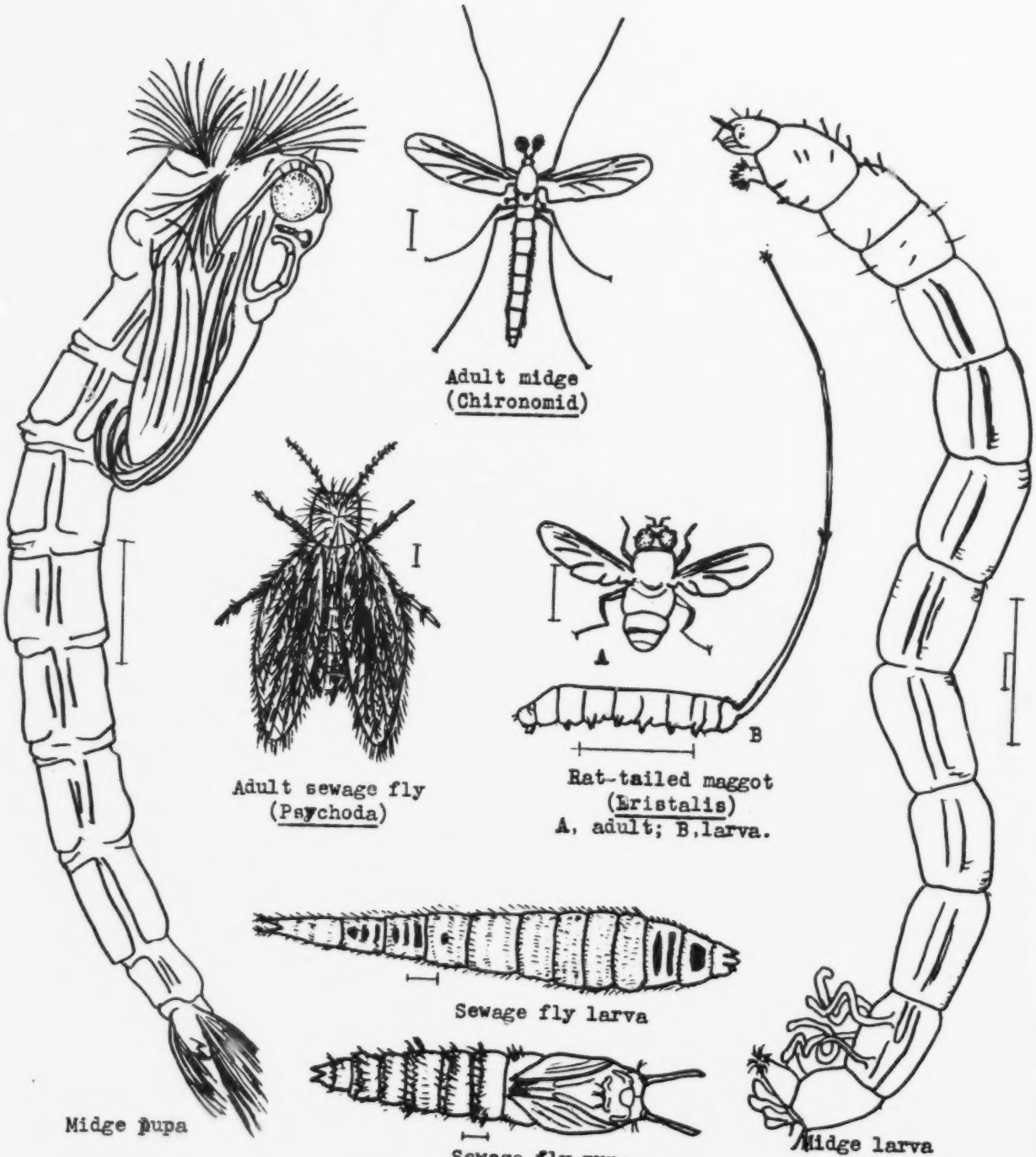
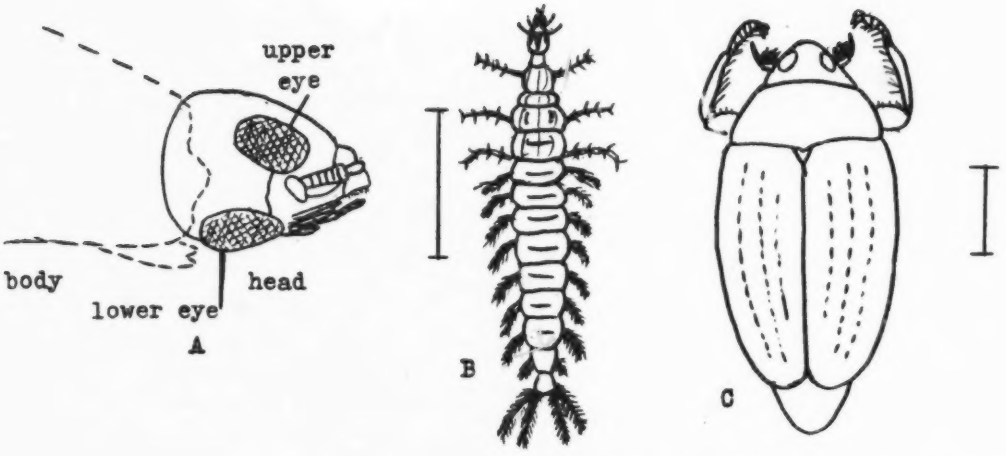
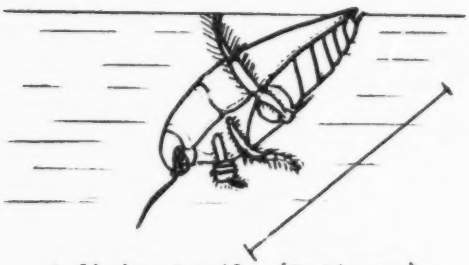
Two Winged Flies
Order DIPTERA



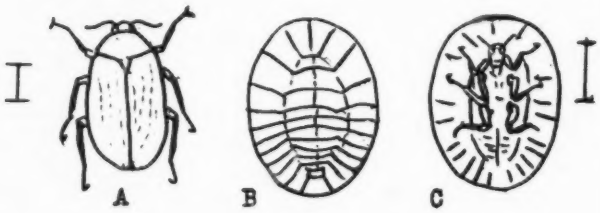
H.W.Jackson
After various authors



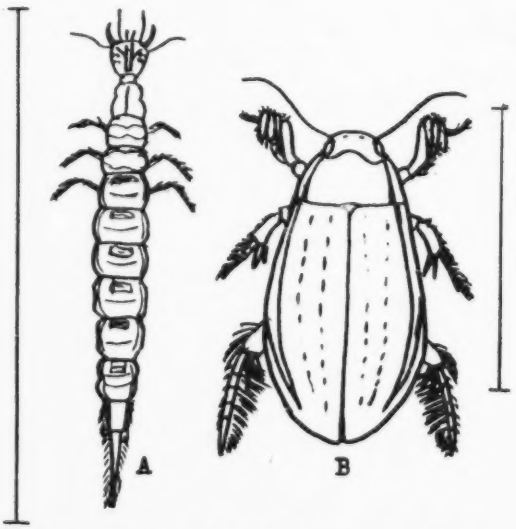
Whirligig beetle (Gyrinus) A, Side view of head of adult showing divided eye; B, Larva; C, Adult. Carnivorous.



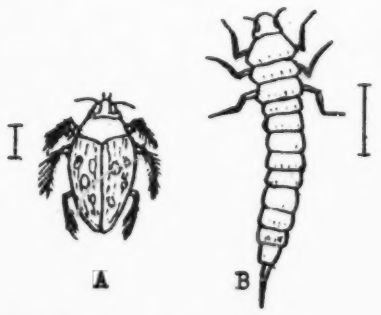
A diving beetle (Dytiscus) taking air at the surface.



The riffle beetle (Psephenus); A, adult; B, dorsal side of larva; C, ventral side of larva. Predominantly herbivorous.



A diving beetle (Cybister). The diving beetles include some of the largest and most voracious of aquatic insects. A, larva; B, adult.

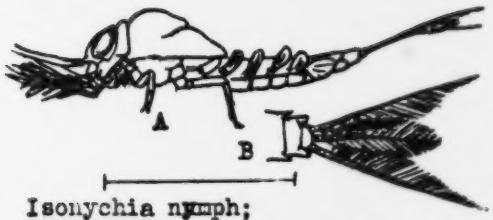


Crawling water beetle; A; adult; B, larva. Predominantly herbivorous.

H.W. Jackson. After Needham, Pennak, Morgan, and others.

May Flies

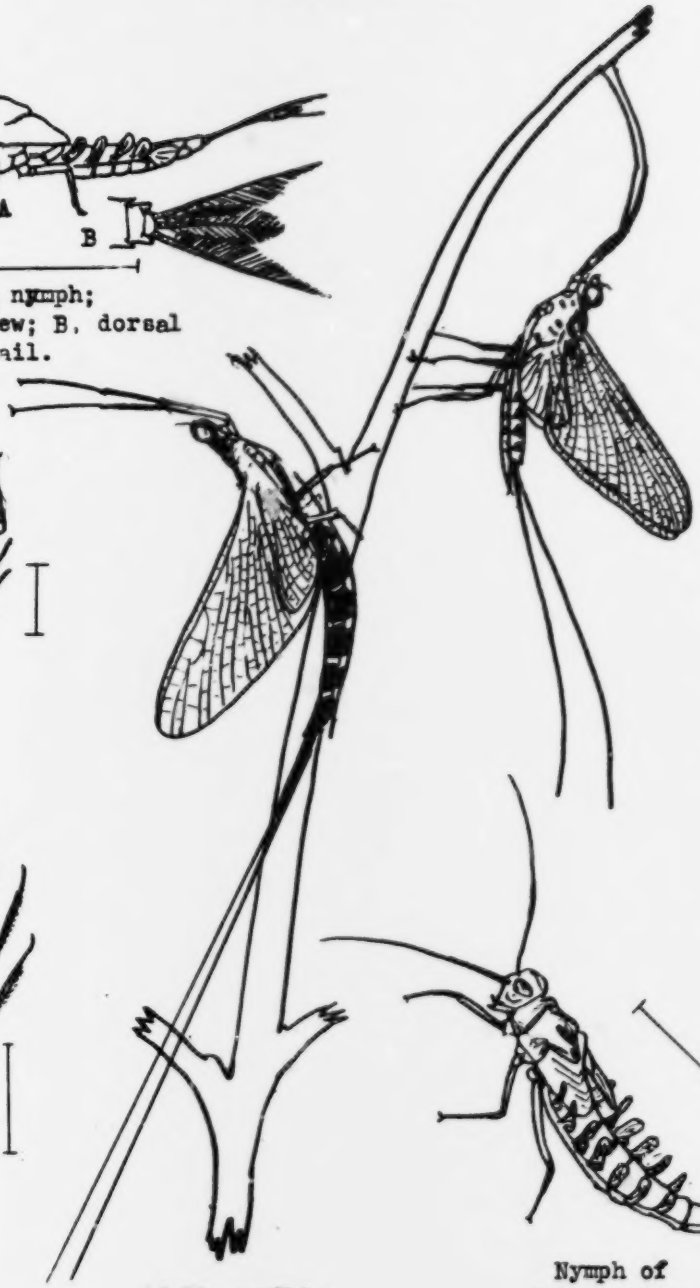
2/4 Order EPHEMEROPTERA



Isonychia nymph;
A, side view; B, dorsal
view of tail.

Iron nymph

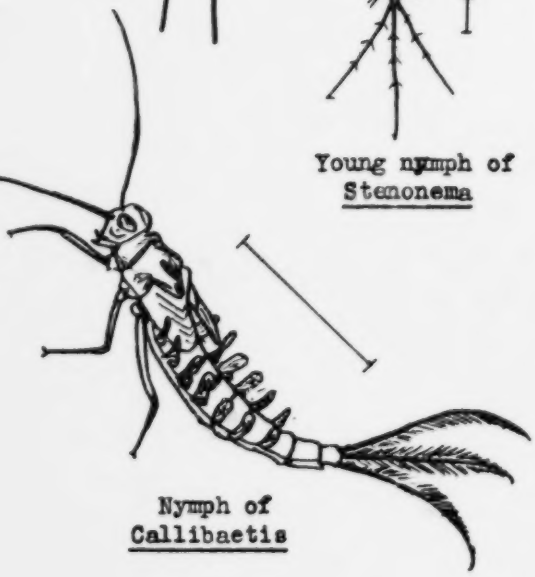
Nymph of
Stenonema



Adult mayflies
(Heptageniidae)

Nymph of
Baetis

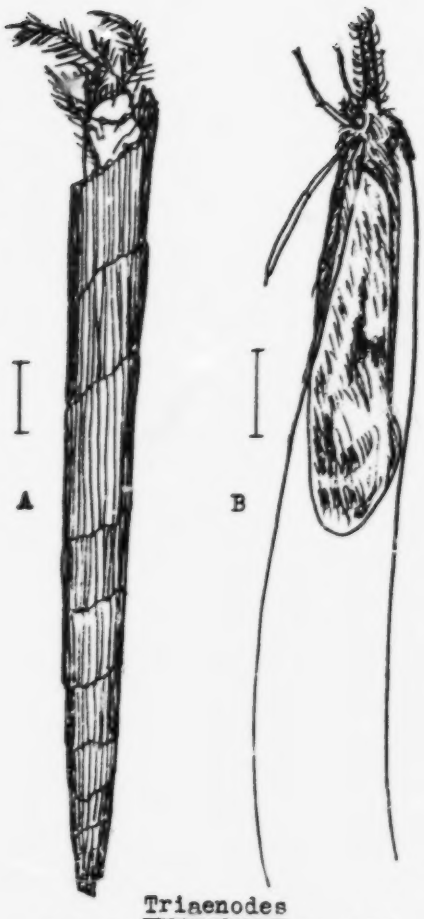
Young nymph of
Stenonema



Nymph of
Callibaetis

H. W. Jackson
After various sources

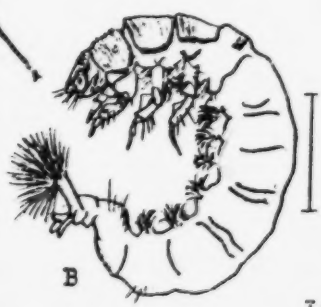
Caddis Flies
Order TRICHOPTERA



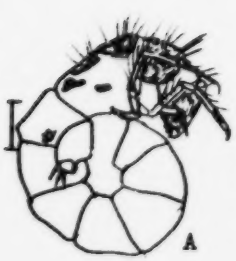
Triaenodes
A, larva and case; B, adult.

Hydropsyche
A, adult; B, larva.

Brachycentrous
Larva and case.

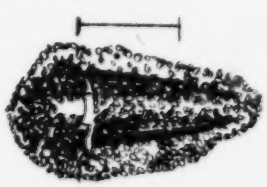


Leptocella
Larva and case.

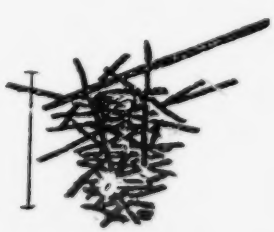


Helicopsyche
A, larva; B, case.

Ochrotrichia
Larva and case.



Molanna larva in case



"Log cabin" type case of Limnophilid larva.

H.W.Jackson
After various authors

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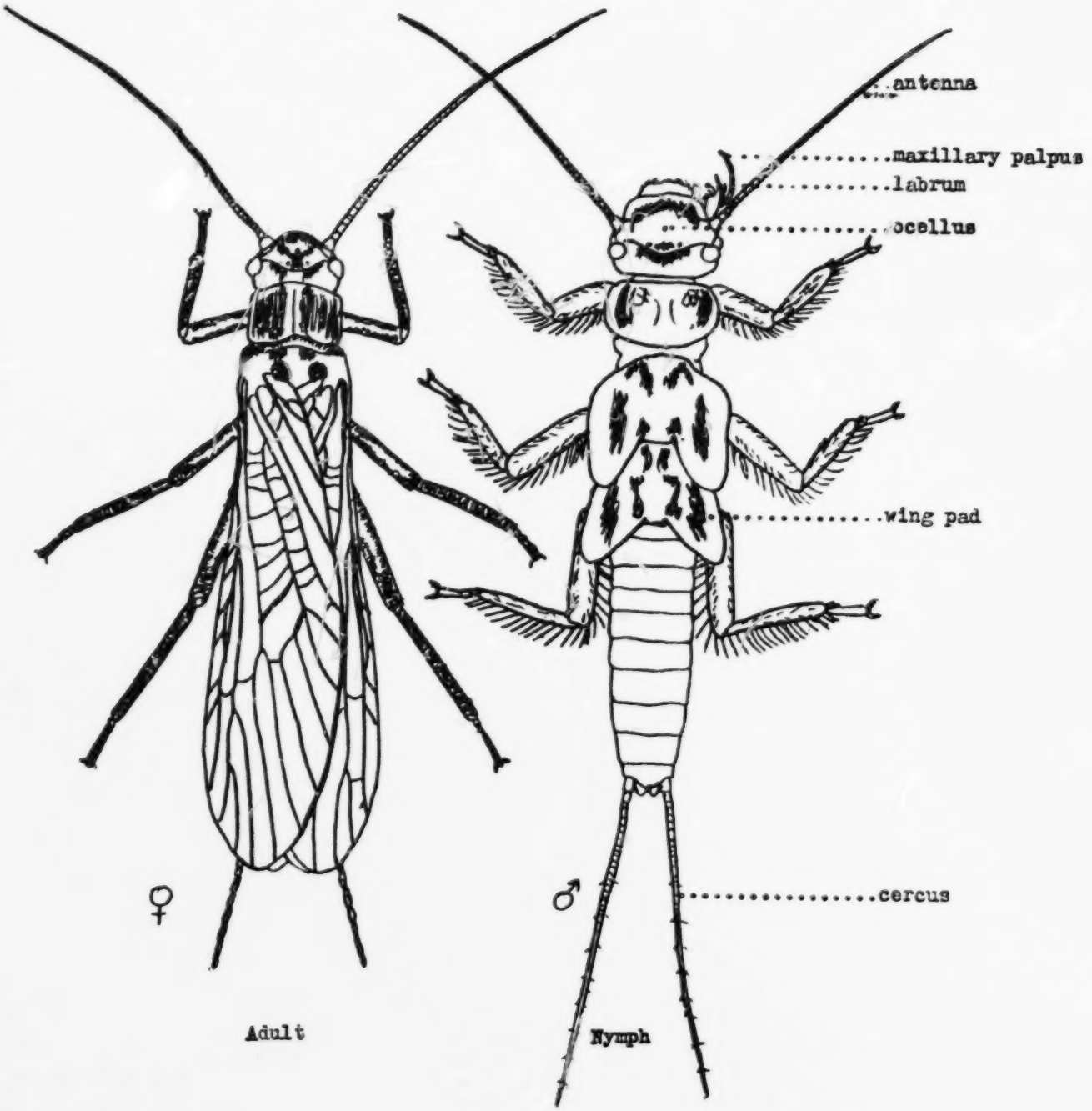
(11/2)

STONEFLIES OR PLECOPTERA

(For Administrative Use)

(Isoperla confusa)

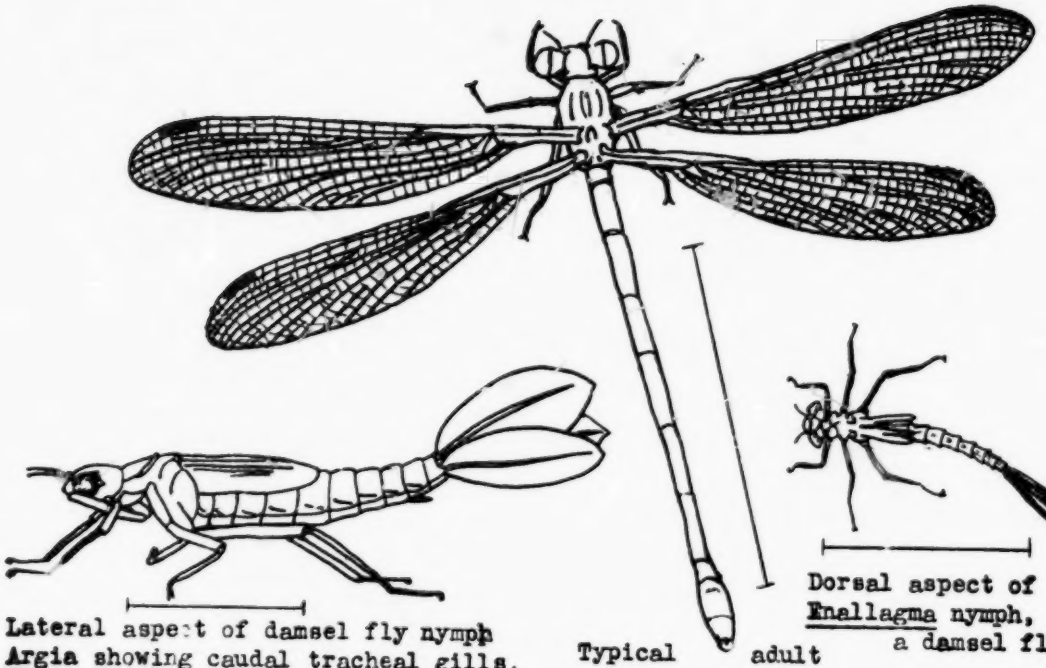


H.W.Jackson

Dragon Flies and Damsel Flies

2/4

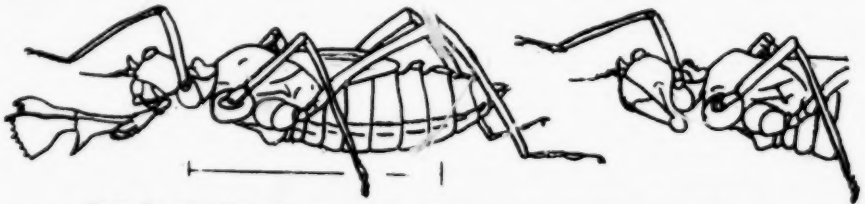
Order ODONATA



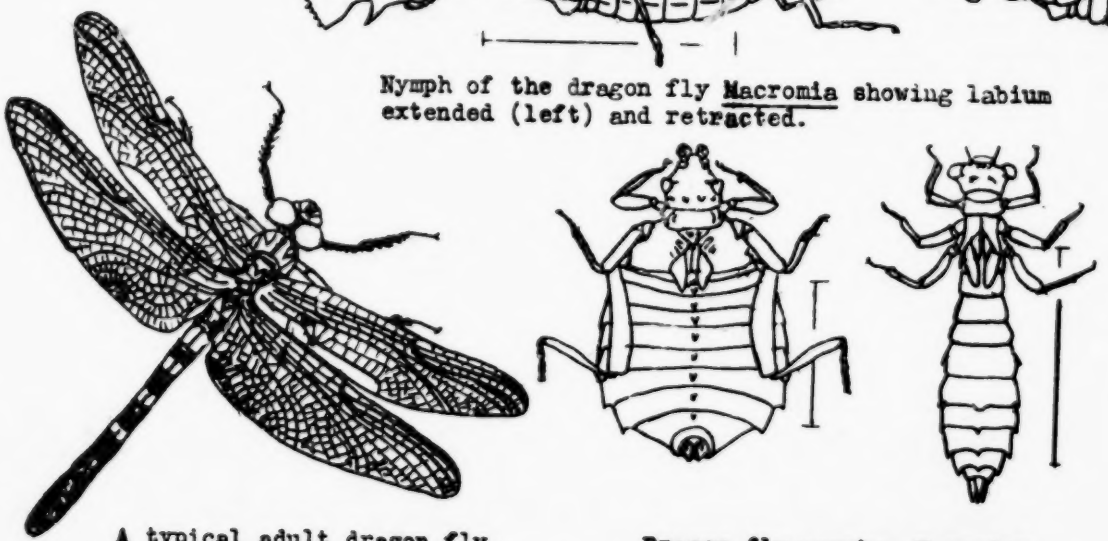
Lateral aspect of damsel fly nymph Argia showing caudal tracheal gills. Note labium folded under head.

Typical adult damsel fly

Dorsal aspect of Enallagma nymph, a damsel fly.



Nymph of the dragon fly Macromia showing labium extended (left) and retracted.



A typical adult dragon fly, Macromia..(2-3 in)

Dragon fly nymphs, Hagenius (left) and Nasiaeschna.

H.W.Jackson

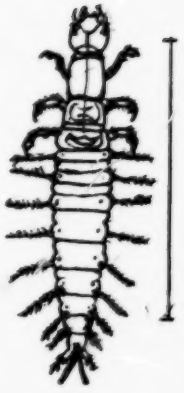
Alderflies, Dobsonflies, and Fishflies

Order NEUROPTERA (MEGALOPTERA)

2/4

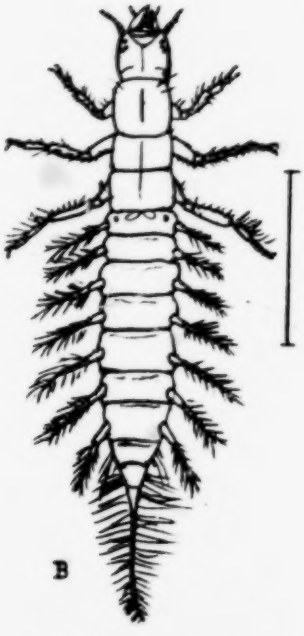
A

A

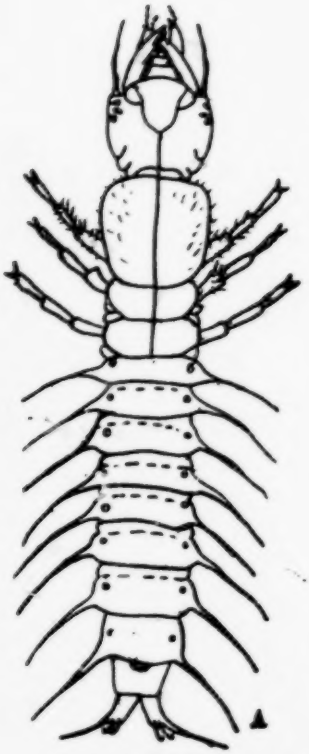


B

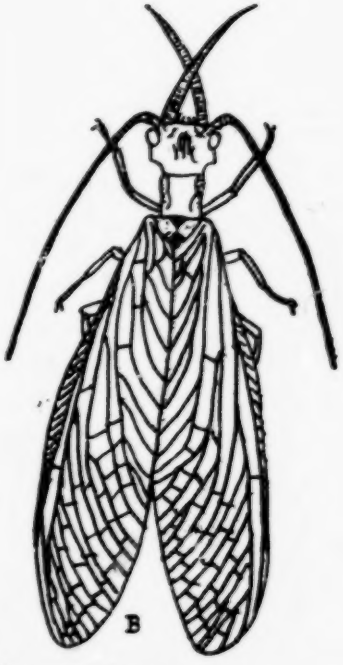
Fishfly, Chauliodes pectinicornis
A, adult; B, larva.



B



A



B

Alierfly, Sialis
A, adult;B, larva

Dobsonfly, Corydalis cornuta
A, larva (hellgrammite); B,adult.

H.W.Jackson

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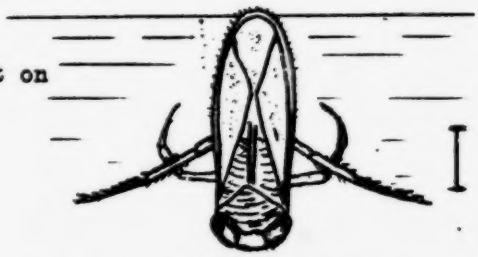
True Bugs, or Sucking Insects
Order HEMIPTERA

Water Scorpion
(Ranatra spp.) Crawls about in shallow water and elevates "snorkel" tail to surface to breath air.

Electric-light bug
(Lethocercus sp)
Extremely predacious on all small aquatic organisms. An active flier, positively phototropic.

Water Strider
(Gerris spp.)
Jumps and glides about on the surface film.

Male water bug (Belostoma sp.) carrying eggs fastened on his back by the female.



Water Boatmen
(Corixa sp.)
This individual is shown with the abdomen just piercing the surface film to renew his air supply. In well aerated water they are able to remain submerged almost indefinitely.

H.W.Jackson. Modified after Needham, Comstock, Snodgrass, and Morgan.